Name: Key Date: _____

1 IB Question # 1: Functions

NO CALCULATOR - Paper 1 22 marks

Let $f(x) = 8x + 3$ and $g(x) = 4x$, for $x \in \mathbb{R}$.

1a. Write down $g(2)$. $g(2) = 8$ 1 mark

1b. Find $(f \circ g)(x)$. $f(4x) \rightarrow 8(4x) + 3$ 2 marks

$(f \circ g)(x) = 32x + 3$

1c. Find $f^{-1}(x)$. 2 marks

$x = 8y + 3$

$x - 3 = 8y$

$f^{-1}(x) = \frac{x-3}{8}$

2a. Let $f(x) = (x-5)^3$, for $x \in R$.

Find $f^{-1}(x)$. 3 marks

$x = (y-5)^3$

$\sqrt[3]{x} = y - 5$

$f^{-1}(x) = \sqrt[3]{x} + 5$

2b. Let g be a function so that $(f \circ g)(x) = 8x^6$. Find $g(x)$. 3 marks

$f(g(x)) = (g(x) - 5)^3$

$\sqrt[3]{8x^6} = \sqrt[3]{(g(x)-5)^3}$

$2x^2 = g(x) - 5$

$g(x) = 2x^2 + 5$

Two functions, f and g, are defined in the following table.

x	-2	1	3	6
$f(x)$	6	3	1	-2
$g(x)$	-7	-2	5	9

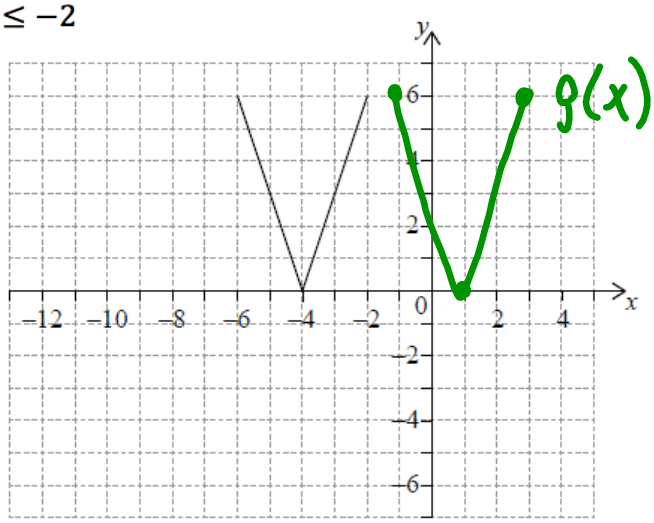
a. Write down the value of $f(1)$. $= 3$ — 1 mark

b. Find the value of $(g(f(1))$. $= g(3) = 5$ — 2 marks

c. Find the value of $g^{-1}(-2)$. — 2 marks

$g(1) = -2$ so $g^{-1}(-2) = 1$

The following diagram shows the graph of a function $y = f(x)$, for $-6 \leq x \leq -2$



There is a minimum point at $(-4,0)$

The points $(-6,6)$ and $(-2,6)$ lie on the graph of f.

Let $g(x) = f(x-5)$. "Right 5"

a. Write down the range of f $[0,6]$ — 2 marks

b. On the grid above, sketch the graph of g. — 2 marks

c. Write down the domain of g. $[-1,3]$ — 2 marks